63-5-4

PRL-TDR-63-10

Relationships Between Attendance at Squadron Officer School and Later Officer Effectiveness Reports

By

Ernest C. Tupes

Technical Documentary Report PRL-TDR-63-10
April 1963

6570TH PERSONNEL RESEARCH LABORATORY
AEROSPACE MEDICAL DIVISION
AIR FORCE SYSTEMS COMMAND
Lackland Air Force Base, Texas

Project 7719, Task 771904

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RELATIONSHIPS BETWEEN ATTENDANCE AT SQUADRON OFFICER SCHOOL AND LATER OFFICER EFFECTIVENESS REPORTS

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ABSTRACT

Two questions of interest to the staff of the Air Force Squadron Officer School were investigated. The first question asked whether attendance at Squadron Officer School resulted in an increase in officer effectiveness, and the second asked whether those officers who achieved the higher grades in Squadron Officer School were more effective in their subsequent career than officers achieving lower grades. The criteria of effectiveness were Officer Effectiveness Reports (OERs) completed on each officer in the 2 years immediately following Squadron Officer School. Results of a series of multiple regression analyses indicated that, when other factors associated with OERs were taken into consideration, no differences were found which could be attributed to either attendance or nonattendance at Squadron Officer School, nor to performance during Squadron Officer School. An appendix presents a nontechnical discussion of the method of multiple linear regression.

This report has been reviewed and is approved.

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Commander

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Technical Director

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RELATIONSHIPS BETWEEN ATTENDANCE AT SQUADRON OFFICER SCHOOL AND LATER OFFICER EFFECTIVENESS REPORTS

I. PROBLEM

This study was designed to answer two questions posed by the staff of the Air Force Squadron Officer School (SOS), with reference to officer effectiveness of graduates of that school. One of these questions was concerned with the effect of attendance at SOS on later officer effectiveness. The other was concerned with relationships between performance during SOS and later effectiveness. Operationally, the questions were stated: (1) Does attendance at SOS result in changes in the OER level? and (2) Do officers who get the higher grades in SOS receive the higher OERs after SOS?

Stated in this way, the questions appear straightforward and the solutions simple. The first question might be answered by examining the OERs of a group of officers who had attended SOS to determine whether their average OER after SOS was higher than their average OER before SOS. If the post-SOS average were higher it might then be concluded that attendance at SOS had resulted in increased officer effectiveness. The second question might be answered equally simply by obtaining some measure of performance during SOS and correlating that measure with OERs after SOS. A positive correlation could then lead to the conclusion that the better performance at SOS had actually resulted in an increase in officer effectiveness after SOS.

Examined more closely, however, the questions are revealed to be far from straightforward and the apparent simplicity of the solutions is quite deceptive. For one thing, the general pattern for all OERs is one of increase in level from year to year. If OERs of all officers have increased during the period of time studied, differences in pre- and post-SOS OERs may reflect merely the overall increase rather than any increase specific to officers attending SOS. Thus a control group equivalent to the SOS group in all respects except having attended SOS is necessary. If the two groups are truly equivalent, comparison of the increase in OERs of the SOS sample with the increase in OERs of the control group provides an indication of any increase in OERs which was a function of SOS attendance. If the two groups are not truly equivalent (and it is impossible to select two groups which are in all respects the same) then results of any such comparison still might be misleading, since the characteristics on which the groups still differed might themselves be related to changes in OERs. If, for example, a larger percentage of the SOS group had been members of a certain major Air Force command than the control group, and that command's overall OER rating trend had differed from the trend in the balance of the Air Force, this fact alone could lead to differing increases in the SOS and control group's OERs.

Similar problems exist in attempting to determine and evaluate relationships between performance while in SOS and later officer effectiveness. A positive correlation between SOS grades and later OERs would indicate that those officers who achieved the most in SOS were also most effective in their subsequent military service. This finding could not, however, be interpreted directly to mean that a high level of performance during SOS was a causal factor in the later effectiveness. It could mean, merely, that those officers who were most effective before SOS were also most effective after SOS and were also those who achieved the highest grades in SOS. Or it could mean that other factors related both to measured effectiveness and to SOS performance were accounting for the observed relationships.

Such problems of control of extraneous variables and interpretation of findings are not, of course, peculiar to the present study. In any data analysis the effect of variables other than those of interest must be nullified before meaningful conclusions can be drawn. However, the number of possibly related variables and the complexity of their interrelationships, as well as their

relationships to measured officer effectiveness (OERs) and to SOS criteria, makes their control more important and more difficult than in many other studies. In fact, only since the advent of electronic computers with their ability to carry out complex statistical techniques has a study such as the present one been feasible.

2. METHOD AND RESULTS

The primary method of analysis was that of multiple linear regression. This technique permits the analysis of the relationships between a criterion variable and various combinations of predictor variables with the effects of any desired variables removed from the relationships. For a full technical exposition of the method and its applications, the reader is referred to Bottenberg & Ward (1963). A brief nontechnical discussion of the multiple regression method is presented in Appendix I.

The first question was concerned with relationships between attendance at Squadron Officer School and later officer effectiveness. A random sample of about half of SOS Class 58C ($N = 446$) was compared with a random sample ($N = 446$) of officers eligible for SOS Class 58C with respect to average OER received in 1959 and 1960. A number of factors known to be related to OERs on which the two groups might differ were taken into consideration. These included command of assignment, length of active commissioned military service, regular or reserve officer, duty AFSC, education, military grade, and average OER prior to 1958. The statistical results of the analysis are shown in Appendix II, Tables 1 and 2. Briefly, it was found that officers attending SOS did have higher later OERs, on the average, than did officers not attending SOS (average OER of the former, 7.29 and of the latter, 7.07). This difference was found to be significant, statistically. However, this difference in later OERs in favor of the SOS group can be accounted for in terms of differences between these two groups which were present at the time the SOS group was selected. Thus it must be concluded that the differences in later OERs of officers attending SOS compared to officers not attending SOS are a function of other differences in the two groups. Attendance at SOS did not change the officers for the better (in terms of later OERs) nor for the worse, either. It may also be concluded that the screening system in effect at the time Class 58C was selected was such that the officers attending SOS were better (in terms of OERs and other related variables) than officers eligible for but not selected for SOS.

The second question asked whether officers who got higher grades in SOS received higher OERs after SOS. This question was answered by comparing the performance in SOS with later effectiveness of all members of Class 58C for whom a complete set of data was available ($N = 587$). Performance in SOS was measured by grades (3 speech grades, 2 writing grades, a special staff study grade, an air-power report grade) and a posttest score. Later officer effectiveness was defined as the average OER received by each officer during 1959 and 1960. Other factors, including scores on three SOS pretests and the variables (command, AFSC, etc.), controlled in the first study were taken into consideration so that the net relationship between SOS performance and later OERs could be determined.

The results are shown in Appendix II, Tables 3 and 4. It was found that performance in SOS (grades plus the posttest score) was related significantly ($R = .27$) with later OERs. However, when the other factors were taken into consideration, it was found that the net relationship between SOS performance and later OERs was not quite significant (Net $R = .13$) at the 5-percent level of confidence. It must be concluded that there is little, if any, relationship between performance in SOS and later OERs which cannot be explained on the basis of differences in officer effectiveness and aptitude existing before SOS. It may also be concluded that officers who are higher in effectiveness and ability before SOS achieve the higher grades in SOS.

3. DISCUSSION AND CONCLUSIONS

The results of this study lead to the conclusion that attendance at SOS did not bring about the higher OERs after SOS and to the additional conclusion that little if any relationship existed between performance while in SOS and later OERs. These conclusions should not, however, be used as the basis for inferences concerning the value of Squadron Officer School in the careers of Air Force officers. There are, of course, several reasons for this statement. In the first place, the OER itself is not an especially good criterion for evaluation of the outcomes of a general military training course. Although the OER is of great importance in the careers of individual officers, when only one or two OERs are available (as in the case of the post-SOS OERs of the present study) their average has not been found to be as reliable (Tupes, 1957; Vanasek, 1962) as is usually deemed desirable for a criterion measure. Secondly, at its best the OER must be considered to be a measure of officer effectiveness on the job, and as such is only one aspect of the worth to the Air Force of any particular officer. Third, SOS seeks to develop the whole officer, and attempting to evaluate SOS on the basis of OER differences is a little like attempting to evaluate the merit of teaching reading or writing on the basis of whether better readers and writers are more successful in later life.. That is to say, the impact on the officer's military career of the broad skills and generalized body of military knowledge taught in SOS or any professional military school cannot be adequately evaluated by early changes (or the lack of such changes) in the level of Officer Effectiveness Reports.

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APPENDIX I

THE RATIONALE AND INTERPRETATION OF MULTIPLE REGRESSION ANALYSES

The studies presented in this report illustrate the application of the multiple regression technique to two superficially different problems: (1) relationships between individual differences on two variables (a predictor and a criterion); and (2) differences between two groups with respect to a criterion variable. In each study a considerable number of other variables were taken into consideration so that their effects on the predictor-criterion relationships and group differences could be nullified. It is apparent that the first study is a multiple and part correlation analysis and that the second study is in the domain of analysis of variance and analysis of covariance.

It is not so apparent, but can easily be shown, that the second study is basically, as is the first study, in the area of prediction of a criterion. For example, when the statement is made that "Group A and Group B are different with respect to, say, OERs," what is also being stated is that "knowing which group (A or B) a particular officer is a member of tells us something about his OER so that we can predict his OER a little more accurately than we could if we did not know which group he belonged to." Knowing nothing about an officer, the best prediction we can make of his OER is that it will fall at the mean of all OERs. If we make such predictions for a number of officers we will of course make lots of errors in our predictions (in fact, the standard deviation of the distribution of prediction errors will equal the standard deviation of all OERs). If we know that Groups A and B differ on OERs and we know which group any officer is a member of, we can now improve our predictions a little. We can do this simply by predicting the OER of any Group A officer to be the same as the mean of all Group A OERs and by predicting the OER of any Group B officer to be the same as the mean of all Group B OERs. We will still, in all probability, make lots of errors in our predictions but not so many as when we predicted each officer's OER to be the same as the mean of all OERs, regardless of the group to which he belonged. The first type of study is also in the area of prediction, only in this case instead of trying to predict a criterion on the basis of knowledge of group membership we are trying to predict a criterion on the basis of standing on another variable. If there is a relationship between a variable, *X*, and OERs, then knowledge of any officer's score on *X* will improve the accuracy of prediction of his OER.

The study of the relationship between a predictor (whether a variable such as *X* or membership in a group such as A or B) and a criterion is a regression analysis. The results of a regression analysis are, usually, a correlation coefficient (to express the degree or accuracy of prediction) and a regression equation which tells what criterion value should be assigned (predicted) for each predictor variable level.

It should be noted that membership in a group is not a variable which can be used in a regression equation. However, group memberships as well as any set of categories or attributes can be transformed into "regression suitable" variables by a very simple process. This process consists of setting up a separate variable for each group, or category, or attribute being studied and giving a score of *1* on that variable to each case that is a member of that group and giving a score of *0* to each one that is not a member of that group. In the example above two new variables would be established: Membership in Group A, and Membership in Group B. All members of Group A would receive a *1* as their score on the first variable while all members of Group B would receive a *0* as their score on the first variable. All members of Group B would receive a *1* on the second variable and all members of Group A a *0*. If there were more groups, more variables would be set up–one variable for each group–and each case would be assigned a score (*1* or *0* as appropriate) on *each* variable. In this way, categories or attributes can be quantified into a form appropriate for regression analysis.

Frequently, more than one predictor is involved in the regression study and then the technique is called multiple regression analysis. The regression equation will now have several terms in it to indicate the criterion value to be assigned for all combinations of levels of the predictor variables.

The results of the multiple regression analysis are, usually, a multiple correlation coefficient to express the accuracy of criterion prediction based on all the predictors in the system, and a multiple regression equation. The F test (Bottenberg & Ward, 1963, Ch. 2) is appropriate for evaluating the statistical significance of the results of a multiple regression analysis. Techniques for the actual computation of multiple correlations and multiple regression equations are explained in nearly all elementary statistics textbooks and need not be discussed here. When more than a few (4 or 5) predictors are involved the computations become tedious and are better done on an electronic computer.

Multiple regression analyses may be based entirely upon continuous predictor variables (test scores, years of education, etc.,) as in the usual multiple correlation taught in elementary psychometric courses. Or the analyses may be based entirely upon one or more sets of categories or attributes (a set would be a group of attributes of the same general nature such as Air Force commands, AFSCs, officer grades) in which instance the analyses give the same results as would an analysis of variance. Or finally, the analyses may be based upon combinations of continuous and categorical variables as in the two studies described in this report.

Whatever the nature of the variables, the analyses answer the same type of question: How well can a criterion be predicted on the basis of other available information? The resulting multiple correlation coefficient (R) provides the answer. The multiple correlation coefficient is usually squared since the square is needed for the F test of significance and is also more directly interpretable with respect to the level of accuracy of the predictions. R^2 times 100 represents the percent of criterion variance accounted for by the prediction or, in other terms, the percentage by which errors of prediction are reduced compared to the errors which would be made if all subjects were predicted to have the mean criterion score.

R^2 represents the proportionate increase in level of accuracy of predictions over the accuracy which could be obtained were no information available except the mean criterion scores. The difference in any two R^2's based on the same criterion represents the difference in accuracy of prediction of the criterion from one set of predictor variables in comparison to another set of predictor variables. When one R^2 is based upon a number of predictors and the second R^2 is based on some smaller number of predictors selected from among those entering into the first R^2, the F test may be used to determine whether the difference in R^2's is statistically significant or whether it might have arisen simply because of chance factors.

In the special case where one R^2 is based upon some subset of the predictors contributing to the other R^2, the difference in the R^2's may be used as an indication of the independent contribution to the prediction system of those variables entering into the second R^2 which do *not* enter into the first R^2. If the first R^2 is based, for example, upon the prediction of OERs from knowledge of the Air Force command (one variable for each command) and the second R^2 is based upon knowledge of command and knowledge of AFSC (one additional variable for each AFSC), then the difference between the R^2's represents the gain in prediction when knowledge of AFSC is added to knowledge of command. That is, the first R^2 represents the best possible prediction based only on command differences and the second R^2 represents the best possible prediction based on command differences and on AFSC differences. The difference between the R^2's represents the gain in prediction when knowledge of AFSC is added to the best possible prediction from knowledge of command. In other words, it represents the relationship between AFSCs and OERs when the effects of command differences have been nullified.

By proper selection of subgroups of variables, differences in R^2's may be used to study the net relationships between any set or sets of predictors and a criterion when the effects of any other set or sets of predictors have been held constant, or nullified. Thus in studying the relationships between attendance vs nonattendance at SOS and later OERs, the R^2 between all relevant predictors (attendance/nonattendance, command of assignment, AFSC, length of service, OERs before 1958, and others) was first computed. Then the R^2 between later OERs and all predictors except attendance at SOS was computed. The difference in these two R^2's (see Appendix II, Table 2) was then obtained and when tested with the F test was found to be nonsignificant (no larger than would be expected by chance) leading to the conclusion that when other differences between those attending SOS and those not attending SOS are taken into consideration, no differences were found between the two groups with respect to later OERs. Similarly, in studying relationships between performance at SOS and later OERs (see Appendix II, Table 4), when the other variables were taken into consideration, no significant relationship was found between SOS performance and later OERs.

Tables 2 and 4 also contain certain other R^2's and differences between R^2's, which are of interest. In each table a high relationship is shown between OERs before SOS and OERs after SOS. When the effects of other variables known to be related to OERs are nullified, the net relationship between early and later OERs is still sizable and still highly significant. This indicates that the OER rating system has a certain degree of reliability over time so that officers rated high (or low) on OERs at one period in their careers will tend to receive high (or low) OERs at a later period.

It may also be seen in both Table 2 and Table 3 that significant multiple correlations are found between OERs and the other non-SOS variables (command, AFSC, military grade, length of service). Because of the restricted and selected nature of the officer sample studied, the magnitude of these multiple correlations should not be stressed, nor should the data appearing in Tables 2 and 4 or in Tables 1 and 3 be used to attempt to determine the magnitude of differences in OERs associated with command of assignment, or AFSC, or any of the other variables. The reader who is interested in OER differences associated with such variables is referred to an earlier study (Vanasek, 1962) which is based on a random and unrestricted sample of all Air Force officers.

APPENDIX II

STATISTICAL TABULATIONS

Table 1. **Correlations of Variables Used in Predicting Later Average OER From Attendance/Nonattendance at SOS**

(Sample: 446 officers in SOS Class 58C and 446 officers eligible for but never attending SOS)

	Variable[a]	Mean[b]	SD	r[c]
1	Attended SOS 58C vs Eligible but Never Attended SOS	.50	.50	.10
2-9:	**Command of Assignment in 1958**			
2	Air Defense Command	.13	.33	.01
3	ARDC (now Air Force Systems Command)	.04	.20	-.03
4	Air Training Command	.15	.35	-.01
5	Far East Air Forces (incl Pacific)	.05	.21	-.03
6	Military Air Transport Service	.10	.31	-.08
7	Strategic Air Command	.28	.45	.14
8	Tactical Air Command	.08	.27	-.01
9	US Air Forces in Europe	.07	.26	-.10
10-15:	**Duty AFSC in 1958**			
10	Pilots and Flight Test	.39	.49	.01
11	Navigator-Observer	.14	.34	-.03
12	Communications, Electronics, & Armament	.06	.23	.03
13	Maintenance & Engineering	.04	.20	-.03
14	Transportation, Logistics, & Supply	.03	.18	-.07
15	Administration, Information, Personnel, & Manpower	.07	.25	.07
16	Regular Officer vs Reserve Officer	.54	.50	.28
17	Months of Active Federal Commissioned Service	62.24	13.14	.11
18	Years of Education	4.83	1.76	.06
19	Science or Engineering Degree	.15	.36	.05
20	Other College Degree	.39	.49	.05
21	Military Grade	2.19	.39	.14
22	OER Average before SOS (before 1958)	5.94	.95	.48
23	OER Average after SOS (1959, 1960)	7.18	1.02	--

[a] As of 1958 except variables 22 and 23.

[b] All variables except numbers 17, 18, 21, 22, and 23 are categorical and are obtained by assigning each a *1* if a member of the category and a *0* if not. For example, any officer in SAC in 1958 was given a *1* on variable 7. Any regular officer was assigned a *1* on variable 16, etc. The mean of the categorical variables is the proportion of the officers in the total sample falling in the particular category. Thus, .04 of the sample were in ARDC in 1958, and .54 (241 officers) of the sample were regular. Some categories (Command and AFSC) had so few members ($p \lesssim .02$) that they were omitted from the analysis.

[c] Pearson product-moment correlations of each variable against the criterion, variable 23.

Table 2. **Multiple Correlations with Average OER After SOS and Percentage of Criterion Variance Accounted for by Attendance/Nonattendance at SOS**

Variables	n[a]	R[b]	%[c]	F[d]	Significance Level
1 Attended SOS 58C vs Not So	1	.10	01.09	9.81	.01
2 All Variables[e]	22	.52	27.06	14.03	.001
3 All Variables except SOS Attendance	21	.52	26.82	15.18	.001
4 Net Prediction from SOS Attendance (2-3)	1	.05	00.24	2.86	Not Significant
5 All Variables except SOS Attendance and OER before SOS	20	.38	14.41	7.33	.001
6 Net Prediction from OER before SOS(3-5)	1	.35	12.41	147.53	.001
7 OER before SOS	1	.48	19.85	207.94	.001

[a] Number of predictor variables.

[b] Multiple correlation

[c] Squared multiple correlation multiplied by 100. Equal to the percent of the criterion variance accounted for by the prediction system.

[d] *F* test as described by Bottenberg & Ward (1963, Ch. 2).

[e] Listed in Table 1.

Table 3. **Correlations of Variables Used in Analysis of Relationship Between Performance in SOS and Later Average OER**

(Sample: 587 officers in SOS Class 58C for whom OERs were available)

	Variable[a]	Mean[b]	SD	r[c]
1-6:	**Command of Assignment in 1958**			
1	Air Defense Command	.13	.34	.04
2	ARDC (now Air Force Systems Command)	.05	.22	-.08
3	Air Training Command	.16	.37	-.05
4	Military Air Transport Service	.13	.34	-.11
5	Strategic Air Command	.30	.46	.18
6	Tactical Air Command	.08	.27	-.03
7-12:	**Duty AFSC in 1958**			
7	Pilots and Flight Test	.43	.49	-.04
8	Navigator-Observer	.14	.35	.05
9	Communications, Electronics, Armament	.05	.23	.03
10	Maintenance & Engineering	.03	.18	.02
11	Transportation, Logistics, & Supply	.03	.18	-.07
12	Administration, Information, Personnel, & Manpower	.06	.24	.01
13	Regular Officer vs Reserve Officer	.52	.50	.21
14	Months of Active Federal Commissioned Service	61.67	12.78	.11
15	Years of Education	4.74	1.80	-.03
16	Science or Engineering Degree	.15	.35	-.01
17	Other College Degree	.39	.49	.01
18	Military Grade	2.13	.34	.08
19	SOS Pretest 1	56.20	7.70	.10
20	SOS Pretest 2	62.75	11.37	.19
21	SOS Pretest 3	46.52	4.98	.08
22	SOS Speech 1, Numeric Grade	33.68	7.30	.16
23	SOS Speech 2, Numeric Grade	34.91	7.62	.11
24	SOS Speech 3, Numeric Grade	36.75	8.01	.09
25	SOS Writing 1, Numeric Grade	33.83	8.47	.17
26	SOS Writing 2, Numeric Grade	33.82	8.16	.12
27	SOS Special Staff Study Score	33.85	8.35	.17
28	SOS Air Power Report	36.70	7.79	.19
29	SOS Posttest Raw Score	109.37	10.21	.12
30	OER Average before SOS (before 1958)	5.89	.92	.43
31	OER Average after SOS (1959, 1960)	7.21	1.03	---

[a] As of 1958 except 19 through 31.

[b] Variables 1 through 13 and 16 and 17 are categorical. See Table 1, footnote b.

[c] Pearson product-moment correlations of each variable against the criterion, variable 31.

Table 3. **Correlations of Variables Used in Analysis of Relationship Between Performance in SOS and Later Average OER**

(Sample: 587 officers in SOS Class 58C for whom OERs were available)

	Variable[a]	Mean[b]	SD	r[c]
1-6:	Command of Assignment in 1958			
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3	Air Training Command	.16	.37	-.05
4	Military Air Transport Service	.13	.34	-.11
5	Strategic Air Command	.30	.46	.18
6	Tactical Air Command	.08	.27	-.03
7-12:	Duty AFSC in 1958			
7	Pilots and Flight Test	.43	.49	-.04
8	Navigator-Observer	.14	.35	.05
9	Communications, Electronics, Armament	.05	.23	.03
10	Maintenance & Engineering	.03	.18	.02
11	Transportation, Logistics, & Supply	.03	.18	-.07
12	Administration, Information, Personnel, & Manpower	.06	.24	.01
13	Regular Officer vs Reserve Officer	.52	.50	.21
14	Months of Active Federal Commissioned Service	61.67	12.78	.11
15	Years of Education	4.74	1.80	-.03
16	Science or Engineering Degree	.15	.35	-.01
17	Other College Degree	.39	.49	.01
18	Military Grade	2.13	.34	.08
19	SOS Pretest 1	56.20	7.70	.10
20	SOS Pretest 2	62.75	11.37	.19
21	SOS Pretest 3	46.52	4.98	.08
22	SOS Speech 1, Numeric Grade	33.68	7.30	.16
23	SOS Speech 2, Numeric Grade	34.91	7.62	.11
24	SOS Speech 3, Numeric Grade	36.75	8.01	.09
25	SOS Writing 1, Numeric Grade	33.83	8.47	.17
26	SOS Writing 2, Numeric Grade	33.82	8.16	.12
27	SOS Special Staff Study Score	33.85	8.35	.17
28	SOS Air Power Report	36.70	7.79	.19
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[a] As of 1958 except 19 through 31.

[b] Variables 1 through 13 and 16 and 17 are categorical. See Table 1, footnote b.

[c] Pearson product-moment correlations of each variable against the criterion, variable 31.

Table 4. **Multiple Correlations with Average OER After SOS and Percentages of Criterion Variance Accounted for by Performance During SOS**[*]

Variables	n[a]	R[b]	%[c]	F[d]	Significance Level
1 All Variables[e]	30	.52	27.42	6.82	.001
2 All Variables except Posttest	29	.52	27.42	7.00	.001
3 Net Prediction from Posttest (1 minus 2)	1	.00	0.00	---	---
4 All Variables except Posttest & SOS Grades (vars. 22 through 28)	22	.51	25.64	8.46	.001
5 Net Prediction from SOS Grades (2 minus 4)	7	.13	01.78	1.95	Not Significant
6 SOS Grades	7	.26	06.52	4.95	.001
7 All Variables except Posttest, SOS Grades, and 3 Pretests	19	.49	24.42	9.16	.001
8 Net Prediction from 3 Pretests (4 minus 7)	3	.11	01.22	3.06	.05
9 All Variables except Posttest, Grades, Pretests, & OER before SOS	18	.35	12.59	4.69	.001
10 Net Prediction from OER before SOS (7 minus 9)	1	.34	11.83	88.75	.001
11 OER before SOS	1	.43	18.84	135.31	.001

[a] Number of predictor variables.

[b] Multiple Correlation.

[c] Squared multiple correlation multiplied by 100. Equal to the percent of the criterion variance accounted for by the prediction system.

[d] *F* test as described by Bottenberg & Ward (1963, Ch. 2).

[e] Listed in Table 3.